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Perspective article

# A long-term oral health care for a human immunodeficiency virus-infected patient under the coverage of Taiwan's National Health Insurance system

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Human immunodeficiency virus (HIV) is a type of retrovirus that specifically attacks CD4 lymphocytes in T cells of the human immune system. CD4 lymphocytes can help to fight against foreign pathogens. Therefore, if the virus is not controlled by antiviral therapy after being infected with HIV, it will lead to systemic immune insufficiency and the development of opportunistic infections or tumors, which will progress to acquired immunodeficiency

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syndrome (AIDS). In short, AIDS is the most severe stage of HIV infection, but HIV infection is not the same as AIDS. There are three main routes of HIV transmission: blood infection, sexual contagion through body fluids, and vertical transmission from mother to child. However, contact with the saliva, sweat, tears, and urine of HIV-infected people will not cause HIV infection. The treatment for HIV-infected people is high-potency antiretroviral therapy. In the plasma of HIV-infected patients who are stably receiving treatment, the viral load is reduced, while the CD4 lymphocyte count is increased. Therefore, their immune function is more stable than that of the HIV-infected patient who do not receive antiretroviral treatment. Moreover, their average remaining life is almost the same as that of non-HIV-infected individuals.[1] Besides, their needs for oral health care are also not different from those of non-HIV-infected individuals. In 2020, 90 % of people living with HIV in Taiwan knew their status, 93 % of those who knew their status received antiretroviral therapy, and 95 % of those who received antiretroviral therapy successfully suppressed their viral load.[2] This is in line with the "90-90-90" targets by 2020 for HIV prevention and control by the Joint United Nations Programme on HIV/AIDS (UNAIDS).[3] This is attributed to Taiwan's complete National Health Insurance (NHI) system and medical system. Taiwan's disease control policy actively involves the treatment and tracking of HIV-infected people, and promotes the importance of oral health care for HIV-infected people. Through understanding of oral diseases, HIV-infected people can know their oral conditions, maintain good oral health, and seek for appropriate dental treatment.

HIV infection is one of the category 3 legal communicable diseases in Taiwan. After medical staff discover a confirmed HIV-infected patient, they are required by law to report it to the local competent authority. After receiving the reporting of a new case, the local health bureau where the HIV-infected patient lives must contact and guide the patient to a designated medical institution for HIV treatment.[1] Due to the comprehensive reporting system and medical environment, the HIV-infected people in Taiwan usually have the opportunity to know their status and receive good medical care. Through the NHI PharmaCloud system, the clinicians can check patients' complete medication information online through their health insurance cards. Therefore, when a record of HIV antiviral drugs appears in the patient's online medication record, we can be sure that the patient has been diagnosed and reported, the Centers for Disease Control (CDC) has tracked his or her medical status, and the patient has been prescribed medication by a physician of infectious diseases.

In this article, we presented a HIV-infected patient who has been receiving regular oral check-up and dental treatments at a local dental clinic for a long time under the coverage of the NHI system of Taiwan. This 36-year-old male patient came to a local dental clinic on September 24, 2014, with a chief complaint of the decay of the upper left posterior teeth and a request for an oral check-up. Through his health insurance card, the dentist checked his medication record online. The patient had no other dental record in the year before coming to this dental clinic. He had a diagnosis of asymptomatic HIV infection status. He regularly received antiretroviral therapy at National Taiwan University Hospital (NTUH) and took antivirals for systemic use. The drug ingredients were tenofovir alafenamide (fumarate), emtricitabine, and bictegravir sodium. The results of immunological and virological examinations showed that in the patient's plasma, the number of CD4 lymphocytes was within the normal range (500—1500 cells/μL) and the viral load was extremely low. Therefore, he was an asymptomatic HIV-infected patient who had been taking antivirals stably for a long time, and the infection had become chronic. Although this patient did not directly state that he was HIV-infected during registration, according to Taiwan's relevant regulations, medical staff including dentists cannot refuse medical treatment for the HIV-infected patients. In addition, in order to protect the patient's privacy, the dentist paid attention to the surrounding environment when asking about his medical history.

Intraoral check-up and panoramic radiography revealed elongation of the tooth 17, decay with dislodged restoration of the teeth 26 and 27, missing of the tooth 47, pit or mild caries of several other teeth, and full mouth chronic gingivitis with calculi deposition (Fig. 1A). The dentist completed the composite resin restoration for the teeth 26 and 27, full mouth ultrasonic scaling, and oral hygiene instruction on the same day. The subsequent visits for other tooth restoration and periodontal treatment were arranged, and the patient also cooperated with the treatment schedule. After the relevant treatments were completed, the dentist recommended that the patient could consider regular follow-up visits every 3 months and seek for treatment as soon as possible when oral and dental discomfort occurs. From 2014 to 2023, this patient visited this dental clinic a total of 66 times with an average of 7.3 visits per year. The treatment content included regular oral check-up, tooth restoration, ultrasonic scaling, oral hygiene instruction, periodontal emergency treatment, periodontal treatment (subgingival curettage and root planing), topical medication for oral ulceration, topical application with fluoride suspension for sensitive teeth, and tooth extraction. From 2020 to 2023 during the COVID-19 pandemic, however, he visited this clinic a total of 33 times with an average of 8.3 times per year. It shows that the pandemic does not reduce his willingness to seek for dental treatment. Although the patient actively sought dental treatments, this did not include treatment for denture reconstruction. The patient only received conservative regular oral check-up, teeth cleaning, and other general dental treatments covered by the Taiwan's NHI system. Subsequently, the tooth 17 was removed due to elongation with decay in 2021 (Fig. 1B), while the tooth 27 was also extracted due to tooth fracture with decay in 2022 (Fig. 1C). The extraction of the teeth 17 and 27 is a pity, but overall, the patient has been returning regularly for oral check-up and care for a long time. Up to the follow-up visit on November 22, 2023, he has maintained good oral health and retained normal occlusal function from the anterior teeth to the first molar (Fig. 1D). Furthermore, this HIV-infected patient's most recent blood examination results on September 5, 2023 showed that the number of CD4 lymphocytes in the plasma

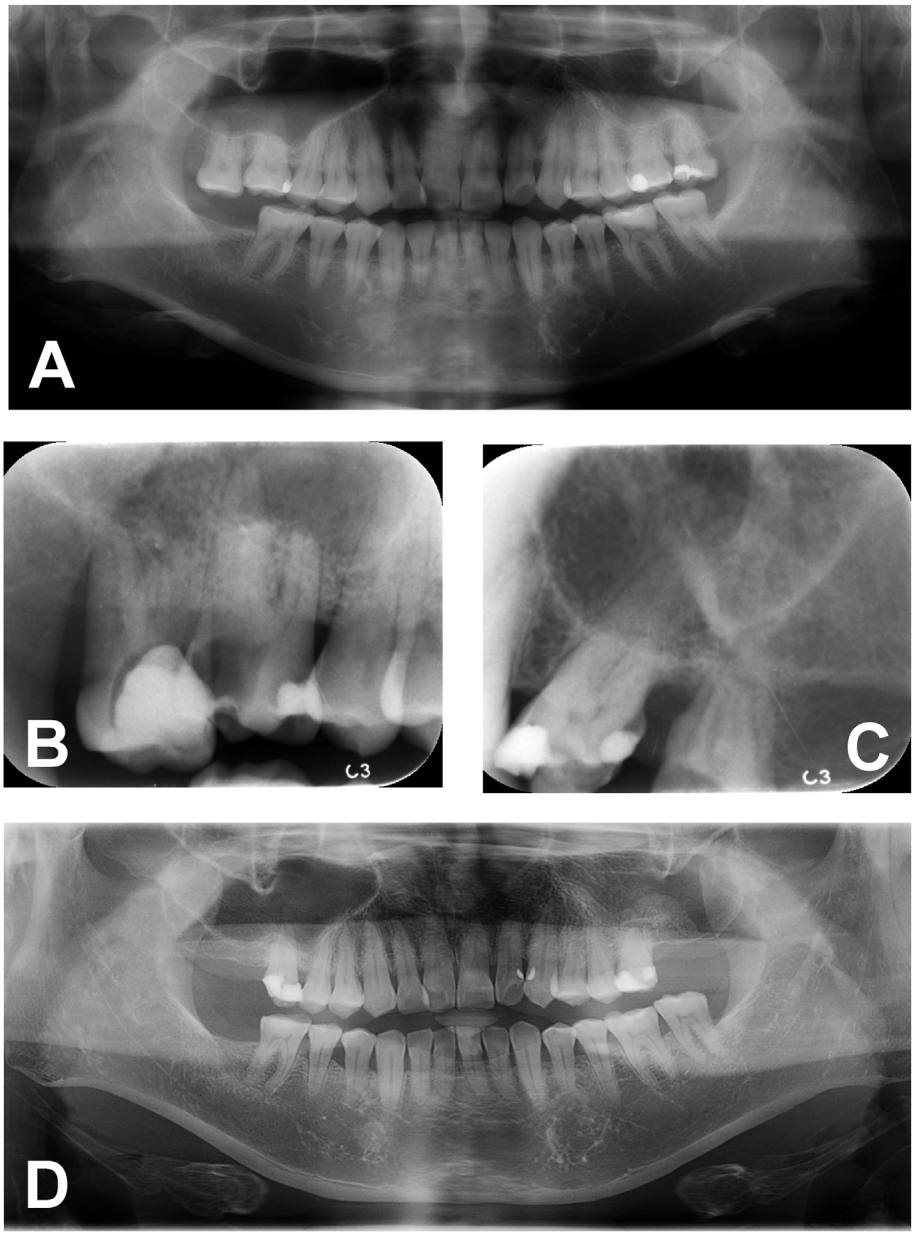


**Figure 1** Panoramic and periapical radiographs of a long-term oral health care for a human immunodeficiency virus-infected patient under the coverage of Taiwan's National Health Insurance system. (A) Original panoramic radiograph of September 24, 2014 revealing elongation of the tooth 17, decay with dislodged restoration of the teeth 26 and 27, missing of the tooth 47. (B) The tooth 17 was removed due to elongation with decay on September 29, 2021. (C) The tooth 27 was also extracted due to tooth fracture with decay on May 25, 2022. (D) The follow-up panoramic radiograph on November 22, 2023 showing normal occlusal function from the anterior teeth to the first molar.

was 872 cells/μL that was within the normal range, while HIV viral load test was negative. At this clinic, the infection control measure implemented during the dental procedures for this HIV-infected patient was the same as that for the ordinary patients, except that the infection control measure was strengthened during the tooth extraction.

According to statistics from the CDC, at the end of 2021, the number of confirmed people living with HIV in Taiwan totaled 34,544.[4] In addition, under the NHI system of Taiwan, the numbers of dental patients and dental outpatient visits were 10,656,945 and 39,130,889 in 2021, respectively. Thus, the dental use rate was 45.4 %, while the average number of outpatient visits per patient was 3.7.[5] If it is estimated at the same proportion, there might be 15,686 HIV-infected people seeking for dental treatment at the dental institutions with the need of 57,598 outpatient visits throughout 2021. In addition, there were 7134 dental institutions (including 212 hospitals with dental departments and 6922 dental clinics) with 15,741 dentists in Taiwan in 2021.[6] This means that each dental institution might encounter at least two HIV-infected patients seeking

for dental services in a year, and each dentist might encounter one HIV-infected patient. Perhaps each patient might need 3—4 visits for the dental treatment. Therefore, each dentist should be familiar with HIV/AIDS-related knowledge and have the ability to deal with oral problems of HIV-infected patients. Although the undergraduate oral pathology course has the learning topic of oral manifestations of HIV-infected patients, the HIV-related knowledge is rarely touched in the continuing dental education and post-graduation clinical training.

We consider that people living with HIV have the same rights to use medical services as other patients. HIV-infected people have the need for good oral health care, including good oral hygiene, correct medical awareness (regular oral check-up and seeking for dental treatment if necessary), and equal rights of medical treatment. They can still obtain good oral health care and maintain good quality of life under the above premise. Therefore, it is important that any dentist should be capable of handling the dental treatments for the asymptomatic HIV-infected patients under a good infection control. Up to date, Taiwan's NHI system can provide complete medical and dental treatment and medication for HIV-infected patients and dentists can know the HIV-infected patients status through the NHI PharmaCloud system. However, for those HIV-infected patients who did not know their status or who knew their status but did not cooperate with the medical treatment, dentists should also have the insight to judge the oral symptoms of AIDS patients (including oral candidiasis, oral hairy leukoplakia, herpetic infection, linear gingival erythema, necrotizing ulcerative periodontitis, Kaposi's sarcoma, and drug administration-induced xerostomia), be able to identify them, and assist them to seek for further relevant medical treatment.[7,8]

The rise of novel viruses or the changes in the epidemiology of known viruses with zoonotic origin is a concern for all health care personnel.[9] In addition to the harm of respiratory infectious diseases caused by enterovirus, coronavirus, influenza virus and so on, dentists may also face potential infection risks from HIV and various types of hepatitis viruses that may not be easily detected from the patients' symptoms and signs or other clinical features. Clearly, modern dentists should maintain a high degree of infection control awareness and enthusiasm for helping those patients with high infectious potentials in their daily dental practice.

## Declaration of competing interest

The authors have no conflicts of interest relevant to this article.

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